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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER	
PADGETT, MARIANNE L	

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1792	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/634,543	DAROLIA ET AL.	
	Examiner	Art Unit	
	MARIANNE L. PADGETT	1792	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on 17 January 2008.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1,4-14 and 16-20 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1, 4-14, 16-20 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 1/17/2008 has been entered.

Applicant has amended their independent claims to explicitly require that their claimed turbine engine rotor component specifically be a compressor disk or a compressor seal element or a turbine desk or a turbine seal element, thus removing the option of the claimed component being a generic compressor component, and hence requiring modification of the previous art rejection, such that Weimer et al. (6,532,657 B1) is no longer an optional reference for any of the claims.

2. Claims 12 & 13 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

On re-review of claims 12 & 13, the examiner noted that exactly what is meant by the option of "maintaining the implanted component at a temperature... in the presence of oxygen", may be considered ambiguous or unclear, since there was no limitation to how long the maintenance occurs (forever?), or no requirement that the component was already at any temperature in either of the claimed ranges, so the temperature can be maintained, in fact for claim 13, it specifically was **not** at the claimed temperature, so cannot be maintained with respect to a preceding lower temperature. A possible interpretation of the "maintaining... a temperature..." language, is that the component, once the process of forming the oxide coating is started, is always and forever afterwards at the specific temperature in the claimed range, or alternately that the maintaining could apply only necessarily to the time period in which the oxide coating is forming (a more sensible option), hence this language may be considered ambiguous as written. Note

that the otherwise analogous claims 19 & 20, only have the heating option, not the maintaining option, thus lacked this ambiguity.

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

4. Claims **1, 4-14 & 16-20** are rejected under 35 U.S.C. **103(a)** as being unpatentable over **Schaeffer et al.** (5,780,110), in view of **Weimer et al.** (6,532,657 B1), or vice versa.

As previously discussed, Schaeffer et al. (5,780,110) teach a coating system for gas turbine engine metallic components generally, or blades & vanes, specifically, where a superalloy substrate that is preferably Ni-based or Co-based superalloy, which components may have a bond coating (NiCrAlY or CoCrAlY) thereon, hence generally describes a rotor component for a compressor of a nickel based alloy (col. 2, lines 45-60). The bond coating superalloy substrate (both substrate & bond coat may be Ni-based) is treated by pre-oxidation **and/or** surface doping, so as to promote adhesion between the interface of the bond coating & thermal barrier coat (TBC). The surface doping may be performed via ion implantation of elements that oxidize faster than Al, such as exemplified Cr or Y, in order to form oxides of the same crystal structure as α-Al_2O_3, where the abstract specifically states surface doping of the bond coating with at **least one** element selected for the group consisting of Fe, **Cr** and **Y** by... **ion implantation**..." (emphasis added), thus reading on ion implanting nickel based alloys with both Cr & Y in order to effect protective oxidation. The "preoxidation" step is suggested to be performed in oxygen rich atmospheres at temperatures >1000°C for times >1 hr after depositing the bond coating, but before deposition of the TBC to heal cracks or pores in the bond coating & thermodynamically stabilize the low atomic volume α-Al_2O_3 phase. See the abstract; figures; col. 1, lines 10-63 (background); summary; col. 2, lines 47-col. 3, lines 6 for general structure & deposition techniques and col. 4, line 41-col. 5, line 4, especially col. 4, lines 47-57 & 66-col. 5, line 4; and claims, particularly 1 & 2. It is noted that while Schaeffer et al. teach that either or both preoxidation & surface doping of the bond coat may be performed, they do not necessitate any order of these two procedures, or provide an explicit example of them being employed together,

but this disclosure suggests any of the listed techniques may be used together & as the doping is intended to enable faster oxidation, this would have had logically suggested to one of ordinary skill of the art to employ it before a step that explicitly causes the oxidation.

While Schaeffer et al. do not teach implantation **depth** *per se*, note that the α-Al_2O_3 interface layer, reference #28, as shown in figure 2 is taught to have a thickness of 0.01-0.25 mils (col. 4, lines 35-38) = about 0.25-6.4 μm = 250-640 nm, hence as the interface may be formed by surface ion doping one of ordinary skill in the art would conclude that appropriate implantation depths in the bond coating would have been on the order of the thickness of the formed interface layer thus suggestive of & overlapping with the claimed implantation depths of up to 2 μ or about 0.1-0.5 μ, which include taught interface thicknesses. Also note that this thickness applies to both the doping to affect oxidation &/or the oxidation procedure of heating in oxygen rich environment, and overlaps with values claimed by applicants.

Schaeffer does not teach the specific rotor components of compressor, turbine disk or seal element, but it has been noted that turbine components in general are suggested, such that it would've been obvious to one of ordinary skill in the art to provide taught protective coating system, specifically designed to protect metallic components from high-temperature corrosion & oxidation problems via thin hard adherent layers, to any susceptible metallic rotor components subject to oxidative and corrosive atmospheres, which would have been expected to be inclusive of claimed service operating temperatures and claimed specific rotor components, lacking any clear evidence that such coatings would not have been expected to be effective.

Weimer et al. (657) considered in combination with Schaeffer et al. (110), show that gas turbine components, such as turbine disk or a rotating seal, are also known to need further protection, are known to be made of Ni-based superalloy, may be treated by analogous (oxidized to produce an oxide layer

having a thickness of ≥ 500 Angstroms) & overlapping sets of steps. Specifically, Weimer et al. (6,532,657 B1) teach the need to protect gas turbine components, such as turbine disks, rotating seals, stationary shrouds, etc., which are said to be particularly subject to corrosion & oxidation damage due to combination of heat and corrosive/oxidative effects of contaminants in the gas cooling (abstract; figure 2; col. 1, lines 4-35; col. 2, lines 21-29; col. 3, lines 50-col. 4, lines 15+), thus specifically showing the need & motivation for protective coatings. The protective coating procedures are the taught to optionally include a protective coating (aluminide or chromide, via CVD etc.), then necessarily an oxidizing treatment to form an oxidized coating (with or without the protective coating first applied), then optionally a top coating (aluminum oxide, silicon oxide, chromium oxide, etc., via any operable technique), thus these teachings include elements such as Al, Cr, Si or mixtures thereof, with teachings of oxidative steps in air that include substrate heating from about 1200°F-1550°F (i.e. about 649-843°C) for at least two hours. Therefore, Weimer et al. (657) is support for the above assertion that compressor, disk & seal element rotor components of turbine engines would also need protective coatings, where the above discussed coatings with oxidized portions would have been expected to be effective for these particular components, as they are made of analogous nickel based alloys. Also, it would've been further obvious to one of ordinary skill in the art that the particular components of gas turbine disks or turbine seal elements, would have been expected to also benefit from analogous oxidation protection, and that the means of supplying this protection could have been effectively provided via techniques as described in the primary reference of Schaeffer et al.

Alternately, as Weimer at et al. (657) teaches protection of these particular disk or seal components of gas turbines via oxidation to form an oxide layer (>500 Å) that may be predominately Al oxide &/or Cr oxide, but may also include oxides of Ti, Ni or Co, plus optionally have aluminum oxide or chromium oxide top coating, deposited via any operable techniques (col. 5, especially lines 20-30, 41-45 & 53-60), it would have been obvious to one of ordinary skill in the art to employ known techniques

applicable to analogous nickel based alloys for providing protective oxide layers, such as the α-Al_2O_3 of Schaeffer et al., which may be affected the accommodations of ion implantation & oxidation procedures.

When discussing their ion implantation process, Schaeffer et al. do not discuss the temperature under which implantation occurs, however as discussed above one of ordinary skill & competence would have been expected to employ routine experimentation to determine the appropriate temperature in which to affect taught ion implantation procedures for specific metallic substrate components, where the majority of the process energy would have been expected by one of ordinary skill to have been supplied by the ion bombardment itself.

Schaeffer also does not discuss the operating temperature range (about 540-815°C = about 1004-1499°F) of their treated metallic superalloy components of gas turbine engines, however they do have general background description concerning it being "well known, the power and efficiency of gas turbine engines typically increases with increasing nominal operating temperature, but the ability of the turbine to operate at increasingly higher temperatures is limited by the ability of the turbine components... to withstand the heat, oxidation and corrosion effects of the impinging hot gas stream and still maintain sufficient mechanical strength. Thus, there exists a continuing need to find advanced material systems for use in components that will function satisfactorily in high performance gas turbines, which operate at higher temperatures and stresses" (col. 1, lines 15-26+), hence the teachings of Schaeffer et al. are clearly directed to creating rotor components with operating temperatures that would have been expected by one of ordinary skill in the art to be inclusive of those claimed. Weimer et al. also does not discuss any specific operating temperatures *per se*, but acknowledges the importance, as well as pretreating in consideration of operating temperatures (col. 3, line 6-18, plus provides corrosion testing at 1300°F (i.e.~704°C), which would have suggested to one of ordinary skill claimed operating temperatures are expected for claimed components.

Schaeffer et al. (110) differs from these claims by not necessarily requiring the taught ion implantation to be performed before the taught heating in an oxygen-containing atmosphere, where additionally some of the claims also are directed to a different temperature range for that heating, however Weimer et al. discussed above as an optional reference, explicitly teach that before the oxidation step is performed, a protective coating may be deposited (col. 2, lines 21-38), i.e. the surface composition is already established, where the elements of Al, Cr, Si, P, or mixtures thereof are particularly noted to be important for establishing the oxidizing protective coating, thus as Schaeffer et al. teach both a related oxidation procedure & supplying overlapping elements to the surface that oxidize faster, it would've been obvious to one of ordinary skill in the art that it would've been advantageous to perform the surface doping step, before the heating in oxygen-containing atmosphere step in order to enable these elements to perform their oxidizing function, as discussed in both references. Furthermore, it would've been obvious to one of ordinary skill in the art that given overlapping techniques, with overlapping materials to effect analogous protective coatings for analogous purposes, that the heating in oxidizing atmosphere parameters of Weimer et al. (col. 2, lines 38-46), would have been expected to be effective in the process of Schaeffer et al., especially for providing protective coatings for the particular components discussed in Weimer et al. (turbine disk or shroud seals) of nickel-based superalloy components, as the material is an option of Schaeffer et al., and the substrates treated therein are broad enough to encompass specific examples of Weimer et al., thus providing expectations that the ion implantation option for surface doping as discussed in Schaeffer et al. would have been effective for supplying elements desired for protective surfaces to be thermally oxidize as discussed in Weimer et al., whether applied to the specific components discussed in Weimer et al., or to the more general turbine components discussed in Schaeffer et al. Further note that in Weimer et al., col. 6, lines 1-13 there is discussion of testing the treated pieces for corrosion at 1300°F, i.e. 704°C, hence suggesting the expected operating temperature for treated

components to be in this vicinity, thus further supporting the above obviousness of intended use temperatures for components treated by this combination of references.

Alternately Weimer et al. (657) differ by not including a combination of ion implanting (doping) with their oxidation step, however as discussed above, Schaeffer et al. teach the desirability of a ion implantation of claimed elements in order to affect oxidation & protective coating analogous to the oxidation process of Weimer et al., hence ion implantation of claimed elements would have been expected to provide beneficial oxidation effects when forming the protective oxide layer of Weimer. Also note, Weimer et al. provide teachings on the thickness of their oxide layer (>500Å, or preferably 50-600 nm), that are taught as useful for the specific components of the amended claims, thus provide information that one of ordinary skill would have been expected to consider when applying coating processes of the combined references to such specific components, especially noting these values overlap with Schaeffer et al.'s interface thicknesses, while materials of Weimer et al.'s oxide layer overlap also with Schaeffer et al.'s interface composition.

It has been noted, that while Weimer et al. (657) was published within a year of the present filing date, it is to it different inventive entity with only overlapping inventors, thus unless presented with appropriate evidence, is prior art.

5. Claims **1, 4-14 & 16-20** are rejected under 35 U.S.C. **103(a)** as being unpatentable over **Zhao et al.** (6,964,791 B2), in view of **Schaeffer et al.**, further considering **Weimer et al.**, as discussed above .

In Zhao et al. (791), see the abstract, col. 2, lines 43-col. 3, lines 20+ & 47-55; col. 4, lines 3-67; col. 5, lines 7-60; claims & below discussion of teachings therein. Note effective filing date is before the filing date of the present case, and this patent is to the same assignee, but all different inventors.

Claims **1, 4-14 & 16-20** are rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-29 U.S. Patent No. **6,964,791 B2** (Zhao et al.), in view of **Schaeffer et al.**, considering **Weimer et al.** as discussed above .

While the patent claims include the option of the substrate being a nickel-based superalloy, with the pending claims directed to a component of a gas turbine engine, inclusive of the option of a turbine desk, the claim of disposing a coating layer that may contain aluminum, while it may be deposited by ion plasma deposition, which would be inclusive of ion implanting, it does not necessitate that ion implantation occurs during such a process, thus the conflicting claims are not identical, however they are not patentably distinct from each other because the claims are overlapping scope, because ion plasma deposition techniques are inclusive of such techniques including ion mixing due to ion bombardment, thus ion implantation, especially in view of Schaeffer et al., who discusses surface doping techniques that include both ion implantation, plus alternative techniques of plating or sputtering, which would read on the patent (791)'s ion plasma deposition techniques. The secondary references also supply teachings for the obviousness of particular oxidation techniques, for reasons as discussed above, and as the coating technique for the patent claims is intended to be used for like purposes unlike substrates for like results. Other dependent claim limitations are also presented in different orders, and the patent claims requiring coating steps that are neither required nor excluded by the present claims. The independent claims of the patent require specific metal superalloy substrate material, while the present claims are generic or required no specific composition for the component treated. On the other hand, the patent independent claims are generic as to the article that is to be used in a "high-temperature oxidative environment", with only dependent claims 11 & 12 directed to a component for a gas turbine assembly, or specifically a turbine airfoil, a turbine disk or combustor, respectively, and the instant independent claim 1 now requires a turbine engine rotor component, to be specific rotor components that are a disk or seal element of a compressor or turbine.

The patent claims are directed to depositing to coating layers both of which must contain Al, and where the first layer must also contain Zr & may also include Hf, Y, Si &/or Ce, were the physical deposition technique of ion plasma deposition may be employed for both layers, and where the two layers may be reacted/process, so as to effect an Al composition gradient the heating, that may be *in situ* during deposition, thus relevant for providing overlapping & obvious relationships with the patent claim language, for the ion implanting of Al, Cr, Y, Ce, Zr, Cr, Hf & Si ions of the ion plasma deposition limitations. Furthermore, the patent claims use of ion plasma deposition & in situ heat-treating during deposition is considered to read on ion implanting into the preceding layer in light of the specification, which discusses reacting by heat treating on col. 4, lines 42-col. 5, line 6, with *in situ* heating during deposition col. 4, lines 52-67, teaching diffusing the Al of the second layer into the first layer, in particular specifying that the *in situ* heating may be achieved by applying a bias voltage to the substrate during the ion plasma deposition of the second layer. While not explicitly discussed in the body of the specification of the patent, the examiner takes notice that the use of bias voltage in the ion plasma deposition would both create the heating effect due to ion bombardment & provide the Al ions of the plasma with the energy to both deposit on the surface and implant into the surface, thus creating some degree of ion implantation in order to the effect the taught diffusion, thus reading on & encompassing the ion implanting of aluminum in the present claims. Note above discussed arguments for the obviousness of claimed ranges of depth of implantation when considering depth with respect to current and currently deposited coating are also relevant here. While the patent claims do not have a particular claimed temperature range for the heat treating process, one of ordinary skill in the art would determine such via routine experimentation, where analogous to previous discussion above of heating due to ion bombardment/implantation, it is noted that the ion treatment provides alternative energy source, such that the absolute amount of heat required to provide the desired effect, in this case producing the aluminum gradient, would have been expected to be less than if merely heat input, particularly after deposition was

involved. Again in light of the specification, it is noted that post-treatment heating alternative to provide the same gradient effects is taught on col. 4, lines 45-52 require about 700-1200°C, where the 700°C endpoint is noted to overlap with the claimed ion implantation temperature range, hence it would've been obvious to one of ordinary skill to consider these temperatures or lower for effecting the claimed & taught in situ heat treatment during ion plasma deposition, such that considering the non-heat energy component of the bombarding ions would have been expected to make effective the lower temperature ranges as claimed presently by applicants.

6. Claims **1, 4-14 & 16-20** are rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1, 3-10 & 12-19 of U.S. Patent No. **6,532,657 B1** (Weimer et al.), in view of **Schaeffer et al.**, discussed above.

The claims of Weimer et al. (657) are directed to like limitations & similar scope, as discussed above with respect to the body of Weimer et al.'s specification, specifically mentioning the specifically claimed gas turbine disk or seals, and oxidizing treatments at temperatures claimed to create oxide layers of overlapping thickness, however the claims of Weimer et al. differ from the present claims by not employing an ion implanting techniques combined with the claimed oxidizing treatment. However, as discussed above Schaeffer et al., who is also teaching protective oxidation treatments of analogous materials, that are also employed for turbine components, provides teaching of ion implantation of Cr &/or Y intended to be employed for surfaces that are to be oxidized (Cr is also claimed as a desirable element in the oxidized protective structure in Weimer et al.) ,& that may additionally along with the ion implantation of claimed elements be heated in an oxidizing atmosphere to effect desired oxidation, thus for reasons as discussed above, it would have been obvious to one of ordinary skill in the art to employ such ion implantation, which is taught to produce desirable oxidation affects at depths consistent with those claimed in Weimer et al., in order to provide improved & controlled oxidation, consistent with the process claimed. It is also noted that as Weimer et al.'s claims are not directed to ion implanting, they do

not include limitations concerning temperature & heat treatments associated with the ion implantation technique, however relevant teaching is provided in Schaeffer et al., related to the protective coating processing that would have been expected to be equally applicable, modified by the considerations of Weimer et al.'s particular component being treated, with desirable thicknesses therefore, such that it would have been a matter of routine experimentation to optimize temperatures employed with the ion implantation technique of Schaeffer combined with the claimed process of Weimer et al., in order to produce results as claimed by Weimer et al.

7. The patents of Naik (4,919,773) or Bedell et al. (GB 2241961 A) or Manty et al. (4,433,005) remained relevant as teaching references, as discussed above in section 8 of the action mailed 5/8/2007, with their teachings relating to the meanings of "a compressor" ≡ compressor component. As previously cited, see Naik (4,919,773; col. 1, lines 14-30 & col. 2, lines 41-45 teaching gas turbine engine compressor blades & gas turbine compressor components); or Bedell et al. (GB 2241961 A: abstract & page 1, lines 1-7, compressor blade for a gas turbine aero engine or gas turbine compressor or blades); or Manty et al. (4,433,005: col. 1, lines 50-51 & col. 2, lines 3-6 & 18-22, gas turbine compressor environments & gas turbine [titanium] compressor blades), where this references appear to demonstrate that the turbine engine or the turbine is itself a compressor, hence any components thereof such as a vane or a compressor blade, is a compressor component.

Other art previously cited to the same assignee/overlapping inventors included Darolia (6,273,678 B1: col. 7, lines 60-col. 8, lines 18) or 7,087,266 B2: abstract; figures; col. 5, lines 1-9; col. 10, lines 1-8 & claims), which have teachings substantially similar/analogous to Rigney et al. (714) or Darolia et al.((049) or(480)), except they are a bit more general; and Zhao et al. (6,720,088 B2) & Darolia et al. (6,436,473 B2) which are directed to protective coatings for relevant environments & articles, but lacked teachings of techniques with appropriate use of ions; Darolia et al. (6,617,049 B2 or 6,632,480 B2) or Rigney et al. (6,620,525 B1), or Rigney et al. (6,283,714 B1), previously discussed in sections 14-15 of

the action mailed 8/5/2007 with respect to applicants' clarification of the claim language to require implantation of the ions provides a variation in scope, as these disclosures have deposition techniques equivalent to that discussed above for Zhao (791) that do not necessitate or explicitly teach ion implantation , nor turbine disks or seal elements, and while these references are directed to superalloy substrates of rotor components that may be considered to overlap with compressors, only Darolia et al. (480) appears to be specifically directed to nickel-based alloys.

Other previously cited art of interest relevant to the invention included: Fujishiro et al. (4,137,370) & Eylon et al. (5,879,760), which along with Manty et al. ((005) mentioned above) discussing various surface treating techniques involving ion implantation &/or ion plating for providing fatigue &/or oxidation resistant coatings to relevant substrates, but while some of the treatments involve Al &/or Cr, they do not appear to be necessarily ion implanting, although there is background discussion (Manty et al., col. 1, lines 35-51, or also found in Bedell et al.(GB): p.1, line 25-p.2, line 3) concerning ion implantation with metals (i.e. Ce, Y, Al, etc.) of Ti substrates to protect against/inhibit thermal oxidation, but its effectiveness in gas turbine compressor environments was not discussed. Beers et al. (5,580,669) is it of interest for oxidative resistant coatings for Ti alloys, such as used in **gas turbine engine compressor blades, vanes & related hardware**, where depositions employing ion vapor deposition or cathodic arc deposition of Cu alloys inclusive of Al &/or Si constituents are disclosed, for making components useful in claimed temperature ranges, but lacks disclosure concerning whether or not any ion implantation occurs. Paderov et al. (6,797,335 B1), who is also effecting treatments for high resistance to wear & corrosion with sufficient fatigue strength, primarily for **gas turbine compressor blades & vanes**, employs ion implantation with their deposition techniques, however uses nonmetallic ions. Lankford Jr. (4,775,548) has teachings for ion implantation processes of metal ions (i.e. Y, Zr, Zn, Ag, Nb, Ti, etc.), followed by oxidation in air at 600-800°C in ceramic compositions for low friction, high wear resistance at high operating temperatures in "adiabatic diesel engines" (appear to use pistons not

rotors), and White (3,857,682) teaches a surface treatment of seal & bearing surfaces for use in high temperature environments, with mention of jet turbine heat engines & components of materials, such as steel, Al or Ti, with exemplary Al bodies ion plated with Cr, thus White provides cumulative evidence of the importance of treating seal surfaces.

8. Applicant's arguments filed 1/17/2008 and discussed above have been fully considered but they are not persuasive.

Applicant cite paragraphs [0004-5] in their specification, for supporting their argument that disks or seal elements of turbines or compressors in turbine engine rotors have not been coated to protect against oxidation in corrosion, and that "turbine blade coatings are generally too thick and heavy for use on disk and seal elements...", however this latter fails to disclose what scope this relative description covers, thus what constitutes too thick and heavy, so can not be considered to exclude any particular techniques or coatings. Furthermore, while applicants argue that such coating is not done on such seals and disks, Weimer et al. specifically shows that it **is done**, thus this argument cannot be convincing. Note that Weimer et al. is not a 102 reference, i.e. it need not provide all the specific coating techniques in order to show that coating itself is desirable, or to show expected effectiveness of particular techniques, such as oxidation, thus applicants' arguments that Weimer et al. "adds little or nothing to support rejection of claims based on Schaefer" is not convincing, as it is lacking in substance, or discussion of those features that Weimer et al. (657) was cited to support.

9. An update of the search shows Paderov et al. (7,229,675 B1) to be of interest for teaching ion implanting on the inclusive of Cr or Si via ion plasma deposition into metallic substrates inclusive of nickel-based superalloys & gas turbine components, as well as controlled atmosphere annealing treatments, including oxidation, but Paderov et al. does not appear to provide any discussion of the particularly claimed disk or seal turbine components, thus does not provide teachings superior to Schaefer et al.

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Marianne L. Padgett whose telephone number is (571) 272-1425. The examiner can normally be reached on M-F from about 8:30 a.m. to 4:30 p.m.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Timothy Meeks, can be reached at (571) 272-1423. The fax phone number for the organization where this application or proceeding is assigned is (571) 273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

/Marianne L. Padgett/
Primary Examiner, Art Unit 1792

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